Grandstream Networks, Inc.

Grandstream GWN78xx Switches

Stacking Feature Guide

Introduction

Stacking is a horizontal virtualization technology that simplifies network configuration and management by connecting multiple stackable switches together through cable connections and merging them virtually into a single device. Combined with cross-device link aggregation technology, it not only achieves high-reliability backup of devices and links, but also avoids Layer 2 loops. Compared with STP loop protection. With stacking feature enabled, the logic topology is clearer and the link utilization is more efficient.

Please refer to the ***Supported devices*** section to view the switch models that support the stacking feature.

Important Considerations

Before configuring stacking for GWN78xx switches, please ensure you meet the following requirements:

Firmware & System Requirements:

- **Identical Models:** Only switches of the **exact same model** can form a stacking system.

  > ⚠️ ***Important Note:*** *Models with and without "P" (PoE) are considered entirely different models. For example, a GWN7816* ***cannot*** *be stacked with a GWN7816P. They must be an exact match.*

- **Firmware Synchronization:** All switches must run the **same firmware version number**. If a switch joins with an inconsistent version, it will be intelligently **upgraded to match the master device** after the stack is established.

Maximum Supported Devices:

Stacking limits depend on the specific switch model. Please refer to the table below:

Maximum Devices in Stack	Supported Switch Models
Up to 8 Devices	GWN7832, GWN7831, GWN7816(P), GWN7806PL Pro, GWN7806PH Pro
Up to 4 Devices	GWN7830, GWN7813(P), GWN7812P, GWN7811(P), GWN7806(P)

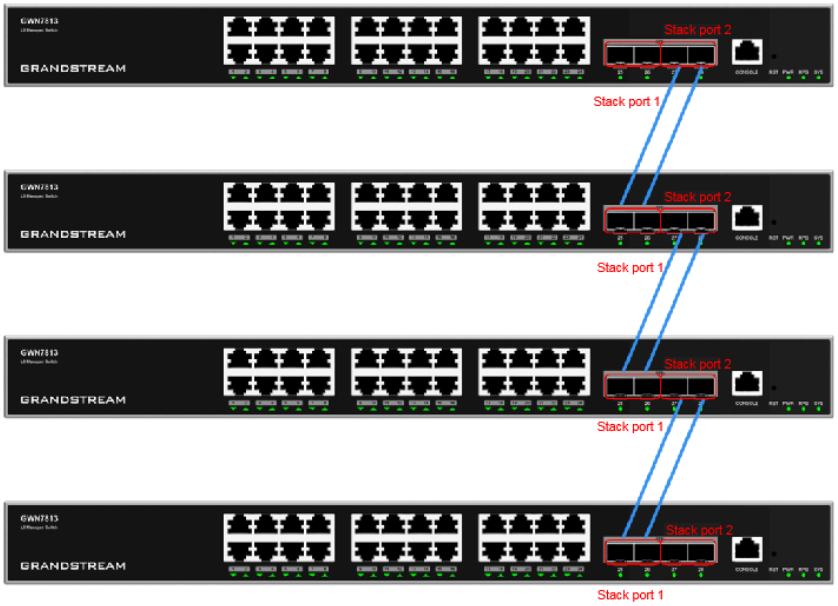
Port & Speed Requirements

- **Eligible Stacking Ports:** Only the **last 4 SFP+ optical ports** on the switch can be added to the stack.
  - *Exception:* For the **GWN7811(P)**, only its **2 SFP+ ports** can be used.
- **Port Speed:** The connection rate must be strictly set to **10Gbps** on all stacking ports.

Stacking Topology

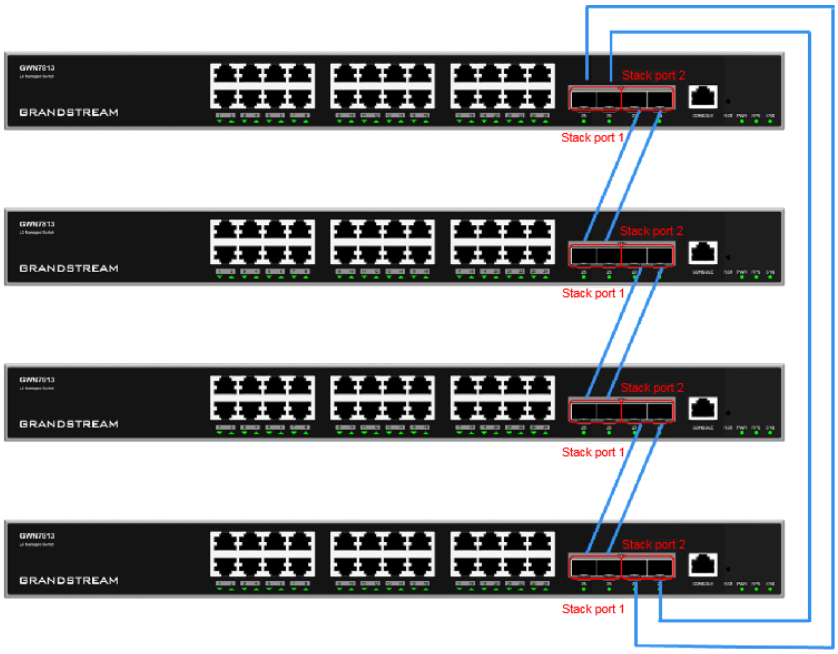
When it comes to stacking, the GWN78xx network switches support two types of network typologies:

- **Chain Topology:** The switches are connected in a linear fashion, where each switch links to the next in sequence. This topology works best for small-scale setups where redundancy isn't a priority. Its main advantage is ease of setup and expansion, making it straightforward for basic networks. However, it has a significant downside: a single point of failure, where if one switch or link fails, all downstream devices lose connectivity.



Stacked Switches Chain shaped

- **Ring Topology:** In this setup, the connected switches form a loop, with the last switch wired to the first, creating a circular path. This topology is ideal for situations where high redundancy is critical, as the loop ensures continuous data flow even if one link fails. The main advantage is its built-in failover mechanism, offering better fault tolerance. However, it can be more complex to configure and maintain compared to simpler topologies.



Stacked Switches Annular shaped

> **Note**
>
> When implementing a stacking setup, make sure to consider stacking bandwidth and to configure it correctly to avoid bottlenecks. The bandwidth shared between switches in the stack should be calculated to determine how much remains available for actual data traffic.

Choosing Between Ring and Chain Stacking Modes

Redundancy and Failover

- **Ring Mode** offers superior redundancy at the switch level. If one switch fails (e.g., hardware damage), traffic can reroute through the ring, and maintain uptime.
- **Chain Mode** lacks switch-level redundancy — a failed middle switch disrupts the stack.
- At the link level, both modes support dual-port links between switches. If one link fails, the second maintains stack communication.

Throughput

- **Ring Mode** can optimize traffic paths, and improve performance.
- **Chain Mode** requires traffic to pass through all intermediate switches, this can increase latency.

Deployment Recommendations

2 Switches:

- No functional difference between Ring and Chain.
- **Best Practice**: Use **all 4 SFP+ ports** for maximum bandwidth and link redundancy.
  (GWN7811(P)/7821P: only 2 ports are stack-capable)

3 or 4 Switches:

- **Preferred**: Use **Ring Mode** (2 links per neighbor) for redundancy and performance — if cabling allows.
- **Chain Mode**: Acceptable for linear physical layouts with cable constraints. where users are forced to use linear cabling and the distance between the switches is large.
- *(GWN7811(P)/7821P: can only form a 1-link stack with each neighbor)*

Stacking Configuration

The GWN78xx Switches support to configure the stacking feature through two different methods:

- **Via the Client Command (CLI)**
- **Via the Web UI**

In the example below, we will configure the stacking feature using the GWN7813 switch model, the same principle will be applied on the other supported switch models, please refer to [***Supported Devices***] section for more information on the devices and their corresponding ports for configuration.

CLI Configuration

Please follow the below steps for a correct configuration:

- **Configure a stack ID:** The ID of each device that joins the stack must be unique, otherwise it cannot be added to the stack.

```
Switch(config)# stack member 1 renumber <renumber-id>
```

> A Reboot of the units is required after this step

- **Configure stack priority:** The higher the value, the higher the priority.

```
Switch(config)# stack member priority <value>
```

- **Configure the stack port**

```
Switch(config)# interface stack-port <member-id>/<port-id>
Switch(config-stack-port)# port interface Ethernet <member-id>/0/<port-id>
```

- **View the Stack Configuration**

```
show stack configuration
```

- **Example**

```
MemberID     NewID        Stack-Port1             Stack-Port2

_____________________________

2            2            Ethernet2/0/9           Ethernet2/0/12
```

Enabling stack function may cause configuration loss on the interface

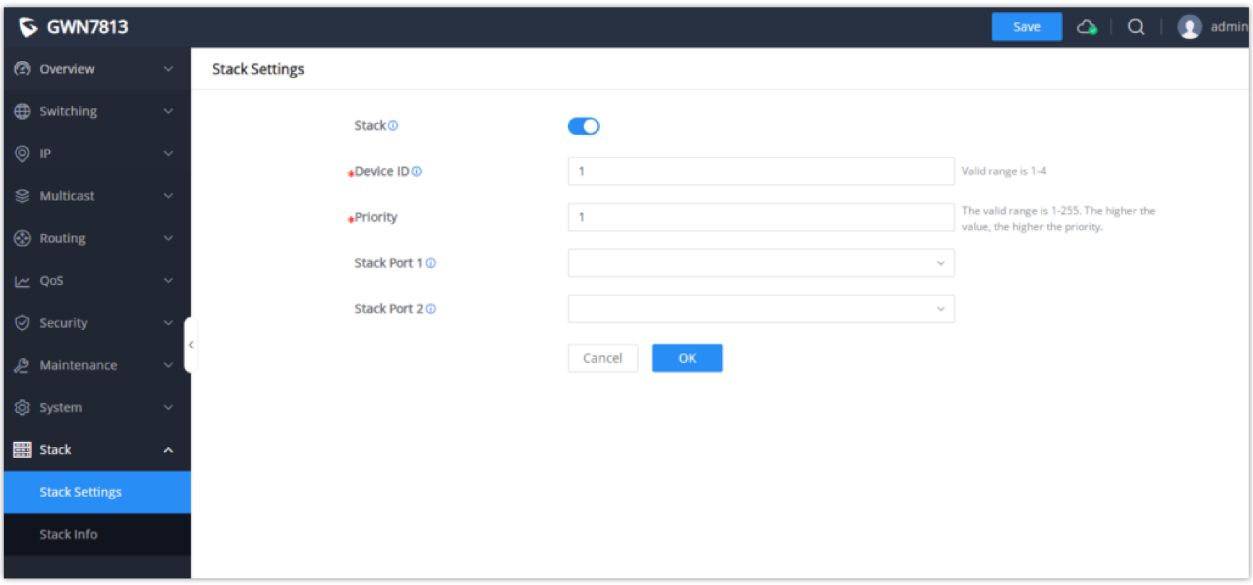
Notes:

- The physical stack port must be in the shutdown state, otherwise the settings will become invalid.
- The device ID of each device must be unique, otherwise the stack cannot be established.
- After changing the stack device ID, you must save the configuration and take effect after the reboot.
- A maximum of 4 physical ports can be selected for each stack port.The physical ports in the two stack ports cannot be duplicated.
- After a stack is established, if only a single device is created, you can modify the ID and priority of the stack. If two or more devices exist, you cannot change the ID and priority of the stack devices.

WebUI Configuration

Please follow the below settings:

- Go to **Stack => Stack Settings**, Set the values of the device ID, priority, Stack port 1 and Stack port 2 on the web UI.



Stack Settings Configuration

Note

After the configuration is completed through the CLI or Web GUI, changes need to be saved, and then restart the device. The device ID and port number will take effect after the restart is complete.

After the preceding configurations are complete, you can view the stack configurations to confirm the configuration from the CLI

```
Switch# show stack configuration
MemberID     NewID        Stack-Port1             Stack-Port2
--------------------------------------------------------------------------
2            2            Ethernet2/0/25           Ethernet2/0/27
```

Wiring the switches

Cross-connect the switches between the member switches, and power them on.

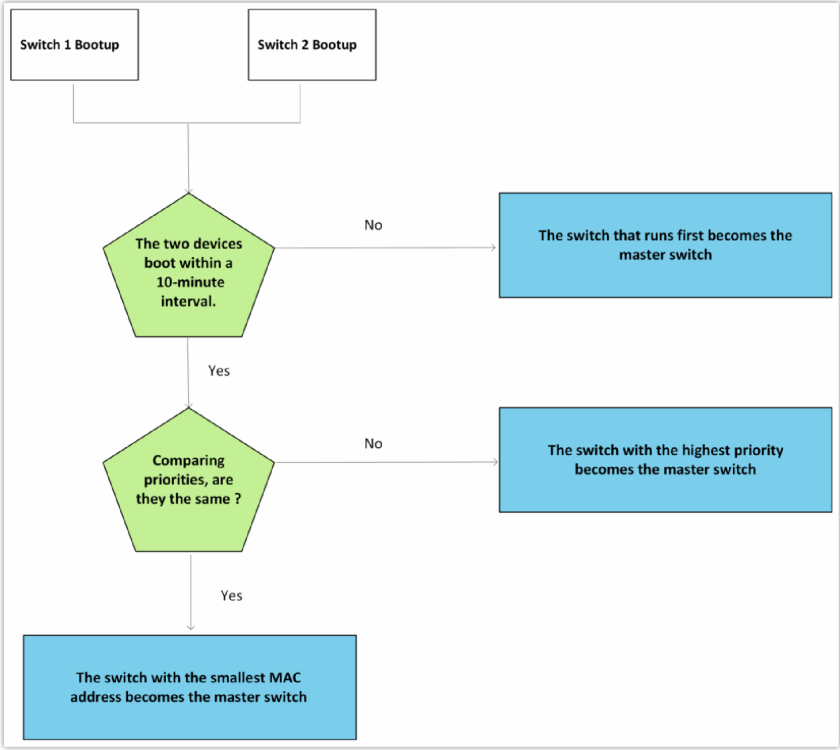
Notes

- Cross-connect, that is, the stack port 1 of device 1 must be connected to the stack port 2 of device 2, and the stack port IDs of the connected devices must be interleaved.
- Use an optical module for the stack port, AOC/DAC Access does not support optical-to-power modules.
- Make sure that the device model and firmware version number are consistent across the different stacked switches.
- Make sure the firmware used supports the stacking feature.
- For the first time trying the stacking feature, please upgrade to the stacking-supported firmware.

Stacked elections

When a stack is established, member devices send stack competition packets to each other to elect the main switch. The role of the master switch is determined by three factors: switch boot time, switch stack priority, and MAC address of the switch. The specific election rules are as follows:

- At startup, the first switch powered on becomes the master switch, and the second switch powered on becomes the standby switch.
- The switch with the highest stacking priority is designated as the primary switch, while the switch with the second-lowest priority becomes the standby switch.
- If stack priorities are equal, the switch with the smallest MAC address is elected as the primary switch, and the one with the second-smallest MAC address becomes the standby switch.



Topology connection

After the master switch election is complete, the master switch collects information about all member switches and calculates the topology.

Steady-state operation

After the master switches calculate the topology information, it synchronizes the topology information of the entire stack system to all member switches and elects a standby switch. The rules for the election of a standby virtual Switch are as follows:

- When comparing stack priorities, the switch with the highest priority becomes the standby switch.
- If priorities are equal, the switch with the smaller MAC address is assigned as the standby switch.

Configure synchronization

The stack uses a strict configuration synchronization mechanism to ensure multiple switches operate as a single network device.

The configuration file consists of:

1. **Global configuration** — settings applicable to all stack members, such as IP addresses and VLAN interfaces.
2. **Interface configuration** — settings specific to each member switch's interfaces, such as port VLAN assignments.

When the stack is formed, each member switch boots with its own configuration. Once started, standby and secondary switches synchronize their configurations from the master switch in batches. New devices added to the stack receive their configuration via this synchronization process.

While running, the master switch manages and instantly synchronizes all user configuration changes across member switches, maintaining consistency throughout the stack.

This instant synchronization ensures that all switches share the same configuration file, allowing seamless operation even if the primary switch fails.

> **Note**
>
> The first synchronization of the stack will take a long time with the device restart, so please wait patiently. Wait for the system indicators of all devices to flash yellow, and then you can log in to the web GUI/CLI of the device to view and operate.

Viewing the Stack Information

Once the stack is established, all member devices operate as a single virtual device, with the master switch managing the collective resources. Access to the stack for management and maintenance can be done via any member device; however, all sessions actually connect to the master switch, which serves as the configuration and control center.

After configuring the master, it synchronizes relevant settings to subordinate switches to maintain configuration consistency across the stack.

You can access the stack system through:

- **Local login:** via the console port of any member device
- **Remote login:** via the Layer 3 interface of any member device using HTTPS, Telnet, SSH, etc.

> **Note**
>
> - Use the master switch's IP address for remote access.
> - Once the stack is formed, its configuration cannot be modified directly. To make changes, the stack must be shut down and members separated before editing and rejoining.

Stack system information can be viewed through the CLI or Web GUI.

View via CLI

To view the stack device list:

```
GWN7831(config)# do show stack
```

- **Example:**

```
Stack enable: True
        Stack topology type: Ring
 Stack system MAC: C0:74:AD:DA:D8:04
 Member      Role        MAC address           Priority    Device type
 ------------------------------------------------------------------------
 * +3         Primary     C0:74:AD:DA:D8:04     1           GWN7813
   4        Secondary    C0:74:AD:E3:EA:9C     1           GWN7813
   5        Subordinate  C0:74:AD:E3:E9:CC     1           GWN7813
 ------------------------------------------------------------------------
 * indicates the device is the primary.
 + indicates the device through which the user logs in.
```

To view the stack topology:

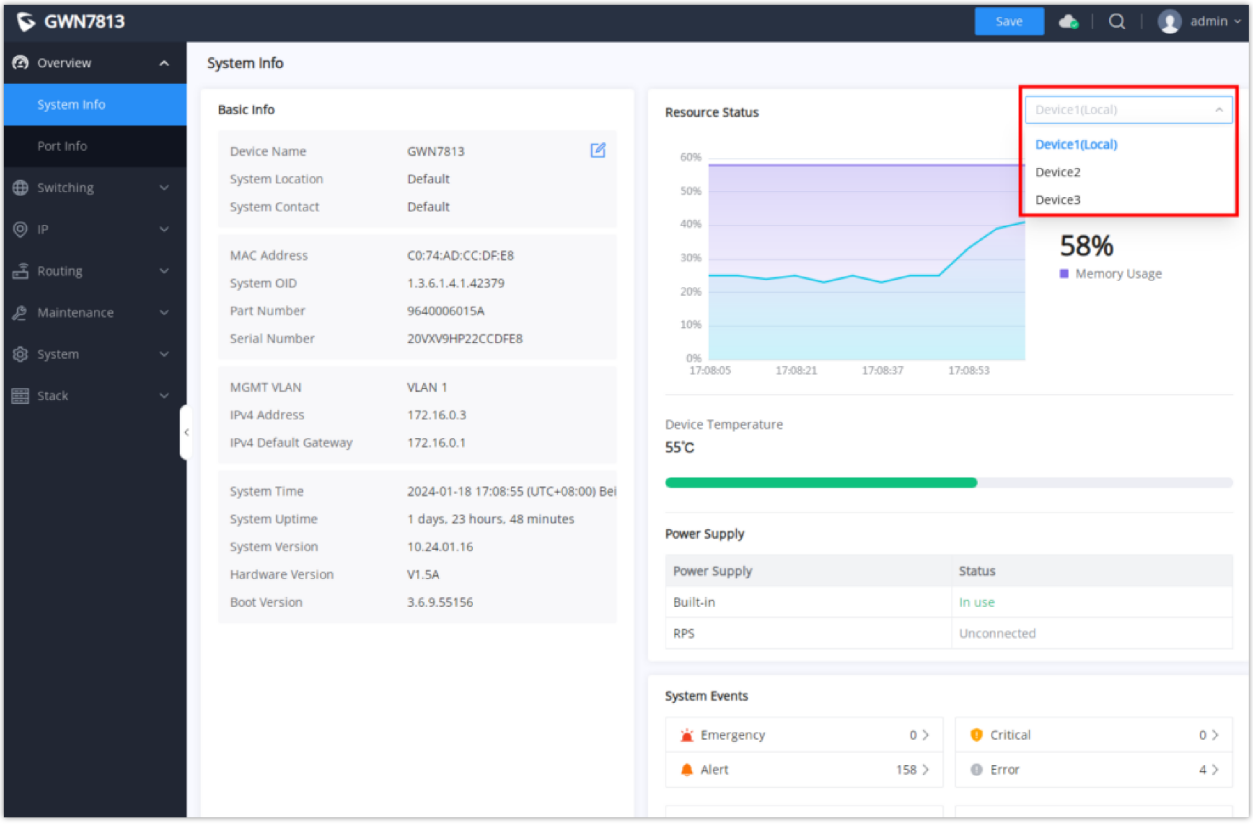
```
GWN7831(config)# do show stack topology
```

- **Example:**

```
                Stack-Port1             Stack-Port2
        MemberID     Link       Neighbor     Link       Neighbor
        ------------------------------------------------------------------------
3           Up          4           Up          5
4           Up          5           Up          3
5           Up          3           Up          4
```

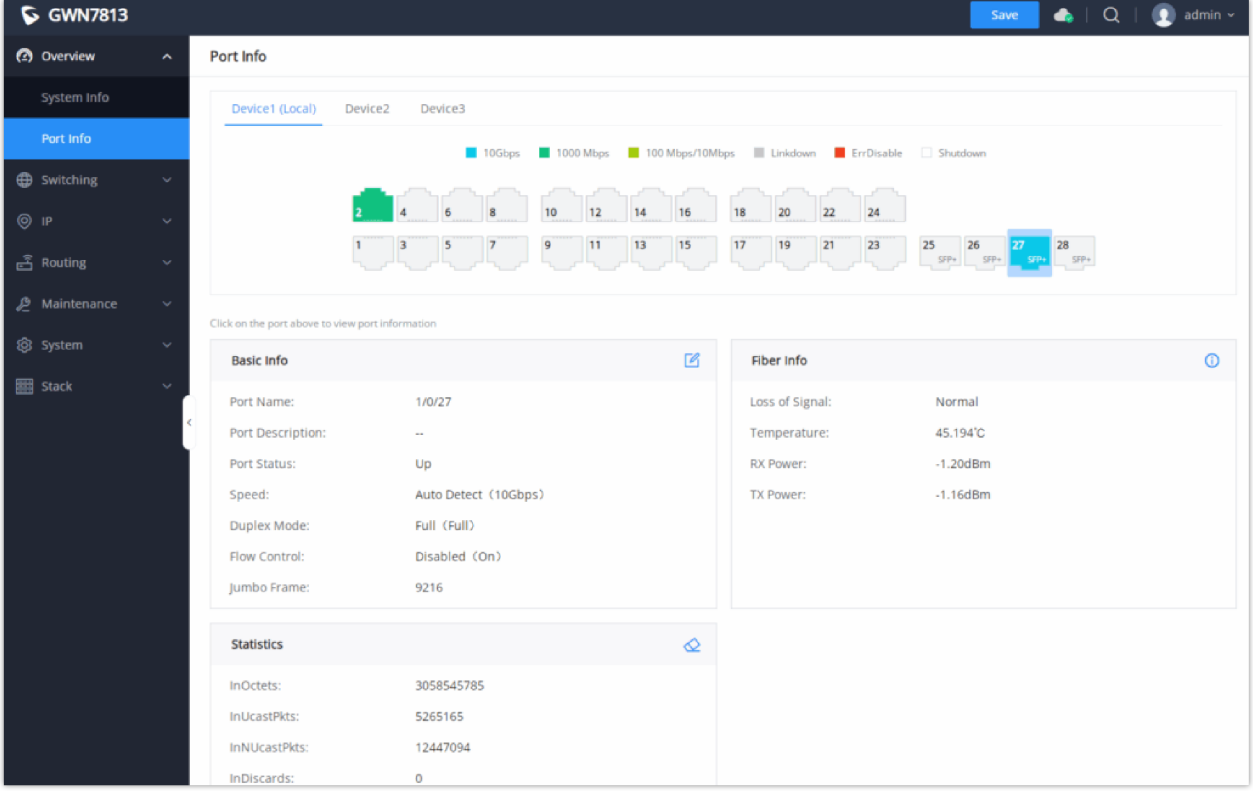
View via the web GUI

After you log in to the web GUI by using the IP address of the main switch, you can view the stack system information in the **Overview** → **System Info** in the left-side navigation pane.

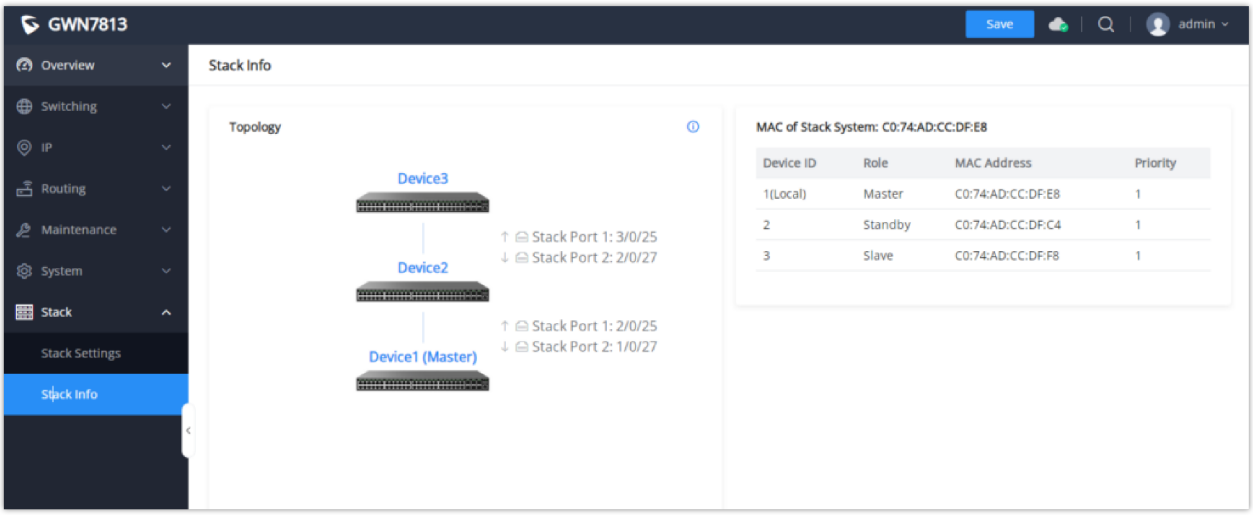


Stack port information 1

Click on **Overview** → **Port Info**, to view local device ports and stacked devices ports:



For more information about stacks, go to Stack → Stack Info to view the topology and device list.



Stack Topology Information

Functional configuration

After logging in to the stack system, you can configure switch functions through the CLI or Web GUI. Not all switch functions are fully supported by the stack, the below mentioned ones on the tables are the supported ones:

Overview	System Information
	Port Information
Switching	Basic port configuration
	Port Group
	Port Statistics
	Loopback Detection
	Port Auto Recovery
	Ling Aggregation
	MAC Address Table:

	VLAN
	Voice VLAN
	STP
IP	VLAN IP Interface
	DHCP Server
	DHCP Relay
	ARP Table
	Neighbor Discovery
	DNS
Routing	Routing Table
	Static Routes
QoS	Port Priority
	Priority Mapping
	Queue Schedule
	Queue Shaping
	Rate Limit
Security	Storm Control
	Port Security
	Port Isolation
	IP Source Guard
	IPv6 Source Guard
	Anti Attack
	DAI
	RADIUS
	TACACS+
	AAA
	DHCP Snooping
	DHCPv6 Snooping
PoE	PoE
Maintenance	Upgrade
	Diagnosis, including log, Ping, Traceroute, Mirroring, Fiber Module, Copper Test, and One-click Debugging
	Backup & Restore
	LLDP&LLDP-MED
	EEE

System	Basic Settings
	Access Control
	User Management
	Time Policy
Stack	Stack Settings
	Stack Info
Others	mDNS
	CPU Protection

Stacking support features

Note

The GDMS Networking/GWN Manager does not support centralized management of stack systems.

Stacked LED indicators

You can use the LED indicator of the device to determine the construction status of the stacking system. See the table below for details:

LED indicator	Indicator status	LED action
System indicator (3-color light).	Yellow flashing	During stack establishment, including master-slave election and first-time configuration synchronization
	Solid yellow	When the stack is established, the master switch is established
	Solid blue	When the stack is established, the slave switch is running normally
	Flashing blue	Subsequent synchronization of the configuration from the switch
	Solid red	Failed to establish a stack from the switch
Stack port indicators (monochromatic except for GWN7832)	Flashes green (blinking frequency 0.03125 seconds).	An error message is displayed for connecting a stack port, for example, stack port 1 is connected to stack port 1

Stacked LED indicators

Q&A – Common Causes of Stacking Failure

Inconsistent Device Models:
Stacking is only supported between compatible models. Mixing different hardware platforms or incompatible series will cause the stack to fail during initialization.

Firmware Version Mismatch:
All switches in the stack must run the same firmware version. If an intelligent upgrade is used to align firmware versions and the upgrade fails on one or more devices, the stack formation will also fail.

Improper Stack Port Connections:
Stack ports must be properly cross-connected between devices in a ring or chain topology. Incorrect cabling (e.g., connecting both ports to the same switch or leaving links open in a ring setup) will prevent the stack from forming.

Duplicate Device IDs:
Each member switch must have a unique device ID. Duplicate IDs cause conflicts in stack role assignments and prevent normal operation.

Unsupported Optical-to-Power Module Usage:
Using non-standard modules such as optical-to-power converters on stack ports can disrupt link negotiation or cause instability, leading to stack failure.

Insufficient Stack Port Bandwidth:
Stack ports must support a minimum of 10Gbps link speed. If the physical link speed is below 10Gbps (due to cable/module mismatch or port limitation), the stack link will not initialize correctly.

Supported Devices

The following table describes the stacking supported by GWN78XX switches:

Supported models	Physical stack ports are supported	Firmware
GWN7806PL Pro	SFP+ 51-54	1.0.15.211+
GWN7806PH Pro	SFP+ 51-54	1.0.15.211+
GWN7806(P)	SFP+ 51-54	1.0.15.126+
GWN7813(P)	SFP+ 25-28	1.0.15.126+
GWN7816(P)	SFP+ 51-54	1.0.15.126+
GWN7830	SFP+ 9-12	1.0.15.126+
GWN7831	SFP+ 25-28	1.0.15.126+
GWN7832	SFP+ 9-12	1.0.15.126+
GWN7812P	SFP+ 17-20	1.0.15.126+
GWN7811(P)	SFP+ 9-10	1.0.15.126+
GWN7821P	SFP+ 9-10	1.0.15.126+
GWN7822P	SFP+ 25-28	1.0.15.126+

List of Supported Devices

Note

Only same model switches can form a stack. If firmware versions differ, the stack will attempt intelligent upgrade.